

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No.: To Be Assigned

Filing Date: Herewith

Applicant: Lou, Hui-Ling et al.

Group Art Unit: To Be Assigned

Examiner: To Be Assigned

Title: ADAPTIVE CHANNEL BANDWIDTH SELECTION FOR  
MIMO WIRELESS SYSTEMS

Attorney Docket: MP0354

---

Director of the United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450

**INFORMATION DISCLOSURE STATEMENT**

Sir:

Pursuant to 37 C.F.R. §§ 1.56, 1.97 and 1.98, Applicant hereby submits an Information Disclosure Statement for consideration by the Examiner.

I. **LIST OF PATENTS, PUBLICATIONS, AND OTHER INFORMATION**

The patents, publications and other information submitted for consideration by the Office (except unpublished U.S. patent applications) are listed on Form 1449 attached hereto.

II. **COPIES**

A. X Submitted herewith is a legible copy of (i) each U.S. patent application publication and U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; (iii) for each cited pending U.S. application, the application specification including the claims, and any drawing of the application which caused it to be listed including the claims directed to that portion; and (iv) all other information or that portion which caused it to be listed.

B. \_\_\_\_ Any patents, publications or other information which are listed on Form 1449 or on the copies of PTO-892, but which are not enclosed herewith, were previously cited by or submitted to the PTO in one of the following applications which has been relied upon for an earlier filing date under 35 U.S.C. § 120:

U.S. Serial Number

U.S. Filing Date

C. X Because the present application was/is being filed after June 30, 2003, no copies of the U.S. patents or U.S. patent application publications which are listed on the attached Form 1449 are enclosed pursuant to the waiver of 37 C.F.R. § 1.98(a)(2)(i). Any foreign patent documents or non-patent literature listed on the attached Form 1449 are enclosed herewith.

D. \_\_\_\_ This is a PCT application in the entry of the National Phase in the United States. A copy of the International Search Report is attached for the Examiner's information. The documents listed on the International Search Report are listed on the attached Form-1449 for consideration by the Examiner and for listing on any patent resulting from this application. Since the International Search Report was from the US, EPO, or JPO search authorities, copies of these references should have been supplied to the USPTO under the trilateral agreement and are believed to be in the file of the above-identified application. (MPEP 1893.03(g))

III. CONCISE EXPLANATION OF THE RELEVANCE (check at least one box)

A. X Except as may be indicated below in (B), all of the patents, publications or other information are in the English language (concise explanation not required).

B. \_\_\_\_ A concise explanation of the relevance of each patent, publication or other information listed that is not in the English language is as follows (see 37 C.F.R. § 1.98(a)(3)):

1. \_\_\_\_ See the attached foreign patent office communication from a counterpart foreign application:
2. \_\_\_\_ English translations are provided:
3. \_\_\_\_ Other:

C. \_\_\_\_ The following additional information is provided for the Examiner's consideration.

IV. CROSS REFERENCE TO RELATED APPLICATION(S)

A. \_\_\_\_ The Examiner is advised that the following co-pending application(s) contain(s) subject matter that may be related to the present application. By bringing this(these) application(s) to the Examiner's attention, Applicant(s) does(do) not waive the confidentiality provisions of 35 U.S.C. § 122.

Serial No.

Filing Date

Art Unit

V. THIS IDS IS BEING FILED UNDER

A. X 37 C.F.R. § 1.97(b): (check only one box)

1.   X   within three months of the filing date of a national application other than a continued prosecution application under § 1.53(d) (37 C.F.R. § 1.97(b)(1)). No fee or certification is required.

2.        within three months of the date of entry of the national stage as set forth in §1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or certification is required.

3.        before the mailing of a first Office Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or certification is required. In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the certification under 37 C.F.R. § 1.97(e) below; or, if no certification has been made, charge our deposit account a fee in the amount of \$180.00 as required by 37 C.F.R. § 1.17(p).

4.        before the mailing of a first Office Action after the filing of a request for continued examination under 37 C.F.R. § 1.114. No fee or certification is required.

B.        37 C.F.R. § 1.97(c): (check only one box)

- before the mailing date of either any Final Office Action under 37 C.F.R. § 1.113, a Notice of Allowance under 37 C.F.R. § 1.311, or an action that otherwise closes prosecution.

1.        No certification; therefore, a fee in the amount of \$180.00 is required by 37 C.F.R. § 1.17(p).

2.        See the certification below. No fee is required.

C.        37 C.F.R. § 1.97(d):

- after the mailing date of either a Final Office Action under 37 C.F.R. § 1.113 or a Notice of Allowance under 37 C.F.R. § 1.311, yet on or before payment of the issue fee.

1.        See the certification below. A fee in the amount of \$180.00 is required by 37 C.F.R. § 1.17(p).

VI. CERTIFICATION UNDER 37 C.F.R. § 1.97(e): (check only one box)

The undersigned hereby certifies that:

A.        each item of information contained in this IDS was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this IDS (See 37 C.F.R. §

1.97(e)(1)). See further statement under 37 C.F. R. 1.704(d) below in section VII, if applicable; or

B. \_\_\_ no item of information contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in this IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this IDS (See 37 C.F.R. § 1.97(e)(2)).

C. \_\_\_ Some of the items of information were first cited in a communication from a foreign patent office. As to this information, the undersigned hereby certifies that each item of information contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby certifies that no item of this remaining information contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in this IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this IDS.

VII. STATEMENT UNDER 37 CFR 1.704(d)

The undersigned hereby states that:

\_\_\_ each item of information contained in this IDS was cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in 37 C.F.R. 1.56(c) more than thirty days prior to the filing of this IDS.

VIII. PAYMENT OF FEES (check only one box)

A. \_\_\_ A check in the amount of \$180.00 is enclosed for the above-identified fee.

B. \_\_\_ Please charge Deposit Account No. 08-0750 in the amount of \$180.00 for the above-indicated fee. A duplicate copy of this paper is attached.


The above references are being cited only in the interest of candor and without any admission that they constitute statutory prior art, contain matter which anticipates the invention, or which would render the same obvious, either singly or in combination, to a person of ordinary skill in the art. Furthermore, this Information Disclosure Statement shall not be construed as a representation that a search has been made.

If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule (with a petition if necessary) and charge the appropriate fee to Deposit Account No. 08-0750.

Please charge any additional fees or credit any overpayment pursuant to 37 C.F.R. § 1.16 or § 1.17 to Deposit Account No. 08-0750.

Respectfully submitted,

Dated: 12/23/03

By:   
Michael D. Wiggins  
Reg. No. 34,754

MARVELL SEMICONDUCTOR, INC.  
700 FIRST AVENUE, MAIL STOP 509  
SUNNYVALE, CA 94089  
408-222-2500

<b>FORM HDP-1449 (Based on Form PTO-1449)</b>  <b>PATENT AND TRADEMARK OFFICE</b> <b>INFORMATION DISCLOSURE CITATION</b> (Use several sheets if necessary)  Sheet 1 of 2	ATTORNEY DOCKET NO.	SERIAL NO.
	MP0354	To Be Assigned
	APPLICANT	
	Lou, Hui-Ling et al.	
	FILING DATE	GROUP
Herewith	To Be Assigned	

U.S. PATENT DOCUMENTS						
Ref. Desig.	Examiner's Initials	Document Number	Date	Name	Class/ Subclass	(If appropriate) Filing Date
1.		2003/0095573 A1	05/22/2003	Vook et al.		
2.		2003/0095508 A1	05/22/2003	Kadous et al.		
3.		2003/0086371 A1	05/08/2003	Walton et al.		
4.		2003/0003863 A1	01/02/2003	Thielecke et al.		
5.		6,493,399	12/10/2002	Xia et al.		

FOREIGN PATENT DOCUMENTS						
Ref. Desig.	Examiner's Initials	Document Number	Date	Country	Class/ Subclass	Translation Yes No
1.		EP1309102A1	07.05.2003	Europe		X

OTHER DOCUMENTS (including Author, Title, Date, Pertinent Pages, etc.)		
Ref. Desig.	Examiner's Initials	
1.		Catreux/Erceg/Gesbert/Heath, "Adaptive Modulation and MIMO Coding for Broadband Wireless Data Networks", IEEE Communications Magazine, June 2002, pp. 108-115.
2.		Chizhik/Foschini/Gans/Valenzuela, "Keyholes, Correlations, and Capacities of Multielement Transmit and Receive Antennas", IEEE Transactions on Wireless Communications, Vol. 1, No. 2, April 2002, pp. 361-368.
3.		Driessen/Foschini, "Transactions Letters On the Capacity Formula for Multiple Input-Multiple Output Wireless Channels: A Geometric Interpretation", IEEE Transactions on Communications, Vol. 47, No. 2, February 1999, pp. 173-176.
4.		Foschini/Gans, "On Limits of Wireless Communications in a Fading Environment when Using Multiple Antennas", Wireless Personal Communications 6: pp. 311-335, 1998.
5.		Goldsmith/Chua, "Variable-Rate Variable-Power MQAM for Fading Channels", IEEE Transactions on Communications, VOL. 45, No. 10, October 1997, pp. 1218-1230.

Examiner:	Date Considered:
-----------	------------------

EXAMINER: Please initial if citation considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<p>FORM HDP-1449 (Based on Form PTO-1449)</p> <p><b>PATENT AND TRADEMARK OFFICE</b></p> <p><b>INFORMATION DISCLOSURE CITATION</b></p> <p>(Use several sheets if necessary)</p> <p>Sheet 2 of 2</p>	ATTORNEY DOCKET No.	SERIAL No.
	MP0354	To Be Assigned
	APPLICANT	
	Lou, Hui-Ling et al.	
	FILING DATE	GROUP
	Herewith	To Be Assigned

OTHER DOCUMENTS (including Author, Title, Date, Pertinent Pages, etc.)		
Ref. Desig.	Examiner's Initials	
6.		Goldsmith/Jafar/Jindal/Vishwanath, "Fundamental Capacity of MIMO Channels", Department of Electrical Engineering, Stanford University, November 8, 2002, pp. 1-36.
7.		<a href="http://www.chipcenter.com/wireless/images/app007_Fig1.jpg">http://www.chipcenter.com/wireless/images/app007_Fig1.jpg</a> , Figure 1: MIMO applied to OFDM (JPEG image 350x230 pixels).
8.		<a href="http://www.chipcenter.com/wireless/images/app007_Fig3.jpg">http://www.chipcenter.com/wireless/images/app007_Fig3.jpg</a> , Figure 3: The MIMO Principle (JPEG image 350x190 pixels).
9.		Mujtaba/Grewe, <a href="http://chipcenter.com/wireless/app007-2html?PRINT=true">http://chipcenter.com/wireless/app007-2html?PRINT=true</a> , Wireless Application Note, "Taking Wireless Networking to the Next Performance Plateau", pp. 1-3.
10.		Mujtaba/Grewe, <a href="http://chipcenter.com/wireless/app007-2html?PRINT=true">http://chipcenter.com/wireless/app007-2html?PRINT=true</a> , Wireless Application Note, "Taking Wireless Networking to the Next Performance Plateau... (Continued)", pp. 1-2.
11.		Seong/Kim, "Adaptive Modulation for MIMO Systems in Time-Varying Channels", EE359 Wireless Communications Fall 2002 Term Project, pp. 1-21.
12.		Winters, "On the Capacity of Radio Communication Systems with Diversity in a Rayleigh Fading Environment", IEEE Journal on Selected Areas in Communications, Vol. SAC-5, No. 5, June 1987, pp. 871-878.
13.		Winters, "Optimum Combining in Digital Mobile Radio with Cochannel Interference", IEEE Journal on Selected Areas in Communications, Vol. SAC-2, No. 4, July 1984, pp. 528-539.
14.		Winters, "Smart Antennas for Wireless Systems", IEEE Personal Communications, February 1998, pp. 23-27.
15.		Wolniansky/Foschini/Golden/Valenzuela, "V-BLAST: An Architecture for Realizing Very High Data Rates Over the Rich-Scattering Wireless Channel", 1998 IEEE, pp. 295-300.

Examiner:	Date Considered:
-----------	------------------

EXAMINER: Please initial if citation considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.